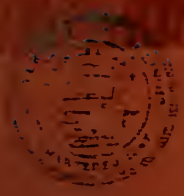

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Multi-Objective Assessment of Strategic Planning Effectiveness: A Discriminant Analysis Approach

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MULTI-OBJECTIVE ASSESSMENT OF STRATEGIC PLANNING EFFECTIVENESS: A DISCRIMINANT ANALYSIS APPROACH

ABSTRACT

The ability of seven key design and implementation dimensions of strategic planning to discriminate between relatively more effective systems and relatively less effective systems is evaluated. Planning effectiveness is assessed using multiple criteria. Results suggest that the determinants of planning system effectiveness tend to vary depending on the specific criterion of effectiveness used. Overall, however, system capacity, resources provided to planning, and functional coverage emerged as the key discriminators.

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The relationship between formal planning and organizational performance is one of the most extensively researched issues in the strategic management field. An illustrative list of studies addressing the impact of planning on performance includes Ansoff, Avner, Brandenburg, Portner, and Radosevich (1970), Fulmer and Rue (1974), Grinyer and Norburn (1975), Herold (1972), Karger and Malik (1975), Kudla (1980), Lindsay and Rue (1980), Malik and Karger (1975), Rue and Fulmer (1973), Thune and House (1970), and Wood and LaForge (1979). A complete review and critique is provided by Armstrong (1982) and Lorange (1979).

Despite the large number of research efforts aimed at elucidating the link between planning and performance, the results of the above body of research are fragmented and contradictory. This state of affairs has arisen because most previous research on the effectiveness of strategic planning systems has suffered from two major conceptual shortcomings. First, most studies have used rather simplistic conceptualizations of the notion of planning. Thus, researchers have been attempting to show differences in financial performance between "planners" and "non planners" or "formal planners" and "informal planners". Second, most studies have been solely preoccupied with the linkage between planning and the financial aspects of corporate performance, even though conceptual writings on formal planning systems stress several non-financial and intangible benefits (Camillus, 1975; Steiner, 1979).

With regard to the definition of formal planning, crude dichotomizations along a single dimension, namely the presence or absence of planning or its degree of formality, are clearly suspect, given that the debate as to what the term "planning" connotes is still a live one (Mintzberg, 1981; Snyder, 1982). Such conceptualizations are inconsistent with the multidimensional

view of planning systems that is becoming more and more visible in the literature (e.g., King & Cleland, 1978; Lorange, 1979, 1980; and Lorange & Vancil, 1977). Similarly, the exclusive emphasis on financial performance is conceptually flawed and is open to attack as being narrowly focused on some and not all benefits of planning.

We believe that a truly valid assessment of the value of formal strategic planning systems should, at a minimum, recognize their multidimensional nature and the plurality of objectives that they can help fulfill. Such an assessment is attempted in this research study. Three distinctive features of this study should be noted. First, based on an extensive literature review, we identify seven distinct design and implementation dimensions that are widely believed to influence the effectiveness of a planning system. Keeping in line with one of Thomas & Tymon's (1982) key criteria for relevant research, the dimensions chosen in this study are levers that practitioners can control. Second, we explicitly recognize the many possible goals of planning, and use multiple criteria for assessing planning system effectiveness. Third, we cast the study in a comparative mode by using the technique of discriminant analysis in order to bring the differences between more effective and less effective planning systems into sharp relief.

DIMENSIONS OF A PLANNING SYSTEM

Planning systems are multifaceted management systems that are contextually embedded. Hence, they cannot be adequately described in terms of one or two characteristics. Although employing different terminology, most writings (e.g., King & Cleland, 1978; Lorange & Vancil, 1977; Steiner, 1979)

emphasize the notion that planning systems are best described in multidimensional terms. Unfortunately, there is as yet no consensus as to what these dimensions are.

Nevertheless, in one way or other, most researchers emphasize two sets of impacts on a planning system's effectiveness. These include (i) the organizational context of planning and (ii) the design elements of the planning system. The former covers such issues as top management support, the level of participation of operating managers and staff planners in the planning process, organizational resistance to planning, etc., while the latter focuses on the design features that make up the planning system (i.e., the extent of coverage given to different functional areas and the level of their integration, the use of specific planning techniques, the degree of attention given to internal and external facets in the planning process, and so on.)

We have synthesized seven systems dimensions that tap the above two major impacts and which appear critical from the point of view of evaluating the effectiveness of planning. These are: (i) system capacity, (ii) use of techniques, (iii) degree of attention to external facets, (iv) degree of attention to internal facets, (v) functional emphasis, (vi) resources provided for strategic planning, including top management support, and (vii) resistance to planning, or as referred to by Steiner (1979), "anti-planning biases." While other dimensions can be identified that might conceivably influence the effectiveness of planning, the above seven have the support of an extensive literature. Also, they are variables that are relatively more amenable to control by managers. The first five represent key design dimensions, and the last two, "resources provided for planning" and

"resistance to planning", are important aspects of the organizational context of planning.

Table 1 summarizes the seven dimensions and indicates the literature supporting the relevant dimension. A brief discussion of each dimension is provided in the following paragraphs.

INSERT TABLE 1 ABOUT HERE

System Capacity

Strategic planning systems differ in the extent to which they emphasize creativity as opposed to control (Camillus, 1975; Shank, Niblock, & Sandalls, 1973). It has been stressed that these two somewhat opposing orientations need to be balanced in order to enhance the effectiveness of a system. An excessive emphasis on creativity at the expense of control or vice versa is apt to be dysfunctional. We conceptualize systems capacity in terms of the ability of the system to foster conrol as well as creativity. The creative capacity of the system is assessed in terms of its ability to anticipate suprises and crises, its ability to adapt to unforeseen changes, etc. On the other hand, the control aspect of the system refers to the degree of emphasis given to managerial motivation, upward and downward communication within the organizational hierarchy, integration of diverse operational areas, etc. As shown in Appendix 1, the systems capacity dimension in this study included thirteen variables tapping the creativity and control orientation of the system.

Use of Techniques

A variety of formal techniques and methodologies have been developed to aid managers in identifying and dealing with strategic decisions and problems

(Grant & King, 1979). The use of these techniques is one indication of the extent of formalization of the planning process. The extent of reliance on planning techniques and methodologies is also an indicator of the organization's approach to decision- making, i.e., comprehensive versus incremental (Fredrickson, 1984).

The extent of reliance on planning techniques is thus an important dimension of the planning system. Since the use of formal techniques is premised on the assumption that they lead to more effective definition and resolution of the ill-structured problems of strategic planning, this dimension can also be expected to impact the effectiveness of the planning system itself over time.

Attention to Internal Facets

A formal approach to planning usually begins with an assessment of the organization's recent history and current situation. This step or stage in planning is variously referred to as "situation audit", "appraisal", etc. (Ansoff, 1965; Steiner, 1979). In this assessment, the organization's internal capabilities receives close study to identify its strengths and weaknesses. Often plans fail because of an inadequate or incorrect assessment of the organization's internal aspects (King & Cleland, 1978). The degree of attention to internal aspects such as past performance, current strengths and weaknesses, and diagnostic assessment of recent failures or performance shortfalls is treated in this study as a distinct and important influence on the effectiveness of an organization's planning.

Attention to External Facets

One of the purposes of planning is to adapt the organization to environmental demands and pressures. Analyzing external opportunities and threats is a major element of formal strategic planning (Andrews, 1971).

There is no need to belabor the importance given in the literature to external orientation as an influence on planning effectiveness. The extent of attention devoted to various aspects of the environment is therefore included in this study as a further aspect of a formal planning system's design.

Functional Coverage

This term refers to the degree of emphasis accorded to various functional areas in planning. This can vary because of strategic differences in the competitive postures of firms in an industry. Some may attempt to compete on the basis of price and volume, while others may emphasize product differentiation and customer service. The distinctive competencies demanded by these alternate approaches are usually manifested as a pattern of emphasis on different functional areas (Hitt, Ireland, & Palia, 1982). In the former case, manufacturing efficienies may be key, while in the latter case, the marketing function may receive special emphasis. A balanced emphasis on all functions may be more important in yet other situations, where general management is the key success factor. The degree of emphasis given to various functional areas was, therefore, included as a planning system design dimension.

Resources Provided for Planning

Many authors have emphasized that planning in an organization cannot be successful unless adequate resources are committed to that activity (e.g., King & Cleland, 1978; Steiner, 1979). These resources may be physical, eg., the creation and maintenance of a separate planning staff and office, or they may be intangible, e.g., the time spent by the CEO and other key managers in the planning function. Planning is not a costless activity. If benefits are expected from formal strategic planning, the organization must be willing to

incur a commensurate level of tangible and intangible costs of doing effective planning as well.

Resistance to Planning

Early research on strategic planning systems emphasized the importance of identifying and overcoming the sources of resistance to organizational planning. Resistance to the system may be manifested in lack of acceptance of the outputs of strategic planning, withdrawal or nominal participation in planning activities without active involvement on the part of opreating managers, gaming behaviors, etc.

The level of resistance to the idea and processes of formal strategic planning can be expected to exert a negative influence on the effectiveness of the planning system. This constitutes our seventh planning system dimension and mirrors an important aspect of the organizational context of planning.

The significance of the above seven dimensions of a planning system are evaluated in this study in terms of their ability to discriminate between "relatively more effective" and "relatively less effective" systems. Thus, we are basically advancing and testing the following proposition:

> P1: Relatively more effective strategic planning systems can be discriminated from relatively less effective ones in terms of the seven key design and implementation dimensions of this study.

This proposition was tested by examining the significance of a set of discriminant functions and their classification accuracies. The choice of discriminant analysis as the appropriate analytical methodology is justified in a later section.

MULTIPLE CRITERIA OF PLANNING SYSTEM EFFECTIVENESS

Just as planning systems can be characterized along the seven design and contextual dimensions noted above, so can they be considered as "multi-objective" systems. The conceptual literature on planning places considerable emphasis on the non-financial objectives of planning, yet empirical tests of the value of planning have been preoccupied almost exclusively with the financial payoffs of planning (Armstrong, 1982). In this study planning system effectiveness was approached from two perspectives. First, the extent of fulfillment of key objectives set for planning were examined. Second, in keeping with most prior research, performance of the organization relative to its competition was also studied as an effectiveness criterion for assessing the planning system.

Fulfillment of Planning Objectives

Our approach to the assessment of planning system effectiveness adopts a broad view of the objectives and functions of planning. Specifically, we consider six commonly emphasized objectives of planning, which are discussed below.

Planning is often justified on the grounds that contemporary organizational environments have become increasingly turbulent, thereby necessitating some formal mechanisms for environmental monitoring and coping with environmental change (Ansoff, 1984; Gluck, Kaufman, & Walleck, 1980, 1982). An objective that follows from this reasoning is the improvement of the ability of a planning system to predict future trends. It is not suggested that planning should necessarily result in accurate predictions of the future, but at a minimum planning should aid an organization in delineating probable, plausible, and preferable future states of the world

(Amara, 1981). Thus, predicting future trends is considered an important task of planning and constitutes our first objective for assessing the effectiveness of a planning system. In fact, according to Paul, Donavan, & Taylor (1978), one of the major problems with strategic planning is the inability of planners to produce reasonably valid forecasts of the future.

Critics of planning always point out the tendency of planning to degenerate into a "numbers game". A good planning system, it has been proposed, should not only serve as a vehicle for mind-stretching (Camillus, 1975), but also should delicately balance control and creativity considerations (Shank, Niblock, & Sandalls, 1973). The extent to which a strategic planning system fosters the creative generation and exploration of alternative courses of action thus becomes a further important test of its effectiveness, and is second in our list of objectives.

Yet another approach to the evaluation of planning is to examine the extent to which the system results in an accumulation of experience and enhances organizational learning. An evolutionary approach to systems design (Lorange & Vancil, 1977) is consistent with the idea that effective planning systems are adaptive learning systems. Learning can be said to be occurring if the system increases the probability of goal achievement and minimizes the recurrence of errors. A corollary is that an effective planning system should enable an organization to avoid problem areas. This is the third objective for planning.

Formalization of planning should lead to an improvement in the quality of management and facilitate management succession. This constitutes the long-term "educational" value of the planning process (Hax & Majluf, 1984). The contribution of planning to the development of an organization's management depth is by no means an easy achievement to evaluate.

Nevertheless, an exploratory effort was made to explicate this linkage by relying on respondents' subjective assessments of the extent to which planning has contributed to management development. This is the fourth objective.

Finally, the importance of performance, both short term and long-term, cannot be overemphasized. In a sense, performance improvement is the raison d'etre for adopting elaborate planning systems in the first place. This is implicit in the exclusive performance focus of the impressive body of planning system evaluation studies identified earlier. However, instead of focusing solely on financial measures of performance, respondents were asked to verbalize their perceptions of the organization's overall fulfillment of short-term and long-term performance goals as a result of planning. These are the fifth and the sixth objectives.

Further, adopting the approach common in the management information systems implementation literature (Lucas, 1978), "satisfaction" with the planning system was treated as an additional effectiveness criterion. Satisfaction is particularly important when the system's use is mandatory as opposed to voluntary, which is likely to be the case for an organization's strategic planning system. Many "planning dysfunctions" documented by early studies of planning failures could be viewed as symptoms of dissatisfaction with planning. Steiner (1979) found that the presence of planning "pitfalls" and dissatisfaction with planning were positively correlated. Satisfaction with the system is likely to reflect objective fulfillment, thus satisfaction can be also be regarded as an additional internal validation criterion for the objective fulfillment variables.

Performance Relative to Competition

In addition to the achievement of key planning objectives, it was posited that effective systems would result in better levels of organizational performance. There is a subtle difference between achieving performance objectives and being a relatively high performing organization. Hence, organizational performance was included as a separate measure of planning effectiveness.

Here again, claim is made to an original departure from the conventional approach to organizational performance. With the exception of studies that controlled for industry effects, most prior studies have used cross sectional samples along with a "universal" performance measure such as return on total assets or return on sales. It can be argued that organizations refer to their proximate competitors rather than a heterogeneous universe of firms in assessing their own performance. Thus, in this study, respondents were asked to indicate their performance, relative to their major competitors, with respect to sales growth, net income growth, market share changes, and return on investment.

We hypothesize that the importance of the seven dimensions identified in the earlier section will vary depending on the effectiveness criterion used. This gives us our second proposition:

> P2: The importance of the seven discriminating dimensions will vary according to the criteria of planning system effectiveness employed.

The discriminating variables (dimensions of the planning system) and the grouping variables (indicators of planning effectiveness) are shown in Table 2.

INSERT TABLE 2 ABOUT HERE

RESEARCH METHOD

Data

Two hundred and seven executives, representing both the planning function and other operating functions, completed a detailed questionnaire on their company's planning practices. This sample represents a response rate of 34.5 percent of 600 executives of Fortune 500, Fortune 500 Service, and Inc 500 companies who received the questionnaire. This level of response from a list of predominantly Fortune 1000 firms is considered higher than is usual for mail surveys of this population (Gaedeke & Tootelian, 1976). The characteristics of the sample are shown in Table 3.

INSERT TABLE 3 ABOUT HERE

The sample is biased in favor of larger firms, and planning executives. Since, smaller firms do not usually undertake formal planning to any significant extent (Robinson & Pearce, 1984), the size bias in the sample is not believed to be serious from the point of view of drawing tentative generalizations about the planning processes of firms that do plan.

As for potential functional bias, there is a sufficiently large subsample of operations executives in our data so that systematic biasing of the responses by function could be assessed. A comparision of the responses of operating executives and planning executives using t-tests indicates that

planning executives as a group did not tend to systematically overrate or underrate their planning systems (Details of this analysis are available from the senior author). However, whether functional bias existed within a particular firm could not be assessed since data were obtained from a single respondent from each organization. This tradeoff between overall sample size and number of responses per firm was both deliberate and inevitable in view of resource limitations. Given that our respondents tended to be top level planning or operating executives, it was felt that they would be both knowledgable and less likely to be biased in their responses.

Operationalizations

Each of the nine dimensions (i.e., seven systems dimensions, and two performance or effectiveness dimensions) was operationalized by multi-item scales. The lack of valid and reliable measurement scales has been one of the impediments to the development of middle-range theories of strategy and strategic planning. In this study, particular attention was paid to the development of valid and reliable measurement scales for the above dimensions. The scales making up each of the constructs of this study are described in Appendix 1.

The procedure used to arrive at the scales described in Appendix 1 was as follows. Each author developed an independent list of items he believed to tap (i) the organizational context of planning and (ii) the design elements of a planning system. In developing their lists the authors relied heavily on the literature on formal planning systems in addition to their own professional experience in the area. The independent lists were then consolidated and shortened by eliminating overlapping, similar, and redundant items. The items were then classified into seven lists, each of which was believed to reflect a particular key dimension of a planning system. These

lists were assessed by a faculty member who served as an outside expert. Based on the comments of this expert, four items were deleted or reassigned to a different category. No items were added. It was judged that the domain of planning systems was adequately covered by the seven dimensions and their individual items and that the items were meaningful and understandable as phrased.

It should be noted that the planning systems dimensions used in this study were specified a priori because of the availability of extensive literature support (see Table 1). Nevertheless, factor analysis of the variable set was undertaken to determine if any further parsimony could be accomplished in the number of discriminating dimensions used. Three to seven factor solutions were prepared and the varimax rotated factor scores were carefully studied. Since, none of the factor structures were easy to interpret, it was decided to rely on the seven originally specified dimensions.

The nine scales exhibited high levels of internal consistency, as indicated by their associated Cronbach alpha values (see Appendix 1).

Preliminary Data Analysis

Given the interest in exploring the systems dimensions contributing to differences in effectiveness between more effective and less effective systems, discriminant analysis was deemed to be the appropriate analytical approach. Nevertheless, given that our effectiveness measures were intervally scaled and that no "natural" effectiveness groupings exist, it was first decided to explore the relationship between the system dimensions and the effectiveness variables using multiple regression.

Thirteen stepwise regression models were derived. Six related the seven systems dimensions to the objective fulfillment variables. In four the

competitive performance variables were the dependent variables. In the final three runs the composite variables and the satisfaction variable were treated as tne dependent variables.

While all the regressions were significant and had multiple R values in the 0.42 to 0.75 range, the coefficients of the independent variables were unstable and sometimes had the "wrong" sign. An examination of the correlation matrix for the independent variable set revealed significant multicollinearity in the data. This further reinforced the original decision to use discriminant analysis as the analytical method, since multicollinearity does not affect the interpretation of discriminant analysis results, many researchers' belief to the contrary (Eisenbeis, 1977).

Groupings for Discriminant Analysis

The groupings for discriminant analysis were constructed as follows. Since responses were provided on a five point scale, all respondents choosing either 1, 2, or 3 were placed in one group, and those checking 4, or 5 were placed in the other group.

Although the grouping of the respondents choosing the neutral rating 3 into the less fulfilled/less satisfied/low performance (or more generally, low effectiveness) categories may appear capricious or prompted by sample size considerations, this choice was in fact made after a very careful analysis of the data. Originally, three groupings were constructed. Respondents indicating scores of 1 and 2 were placed in Group 1. Respondents choosing 3 were placed in a separate neutral group, Group 2. Finally, respondents choosing 4 and 5 were placed in Group 3. One-way analysis of variance was used to examine differences in mean values of the seven discriminating dimensions across these groups. ANOVAS were run for 11 of the thirteen grouping variables shown in Table 2 (the two groupings based on the

composite objective fulfillment and performance indices were naturally excluded because they were continuous variables). Of the 77 ANOVAS, 51 were significant at p = 0.05.

Scheffe pairwise comparisons were done for each significant ANOVA run. A total of 153 comparisions (three per run) were done, of which 62 were significant. In 24 comparisons, groups 2 and 3 were found to be signficantly different while in only 9 comparisons were groups 1 and 2 found to be significantly different.

Thus, neutral and low effectiveness groups tended generally to be more similar than the neutral and high effectiveness groups, on a univariate basis, with respect to the discriminating variables. Our intuitive treatment of the neutral group as a low effectiveness group is thus borne out by the empirical data as well.

In addition to groupings based on the six objective fulfillment variables and four performance variables, two composite variables were also used to form groups. One was a composite of the objective fulfillment variables and the other was a performance composite. In view of the good reliability values of the objective fulfillment and performance scales (See Appendix 1), additive composites of the scale items for each set are considered appropriate as measures of "overall objective fulfillment" and "overall performance", respectively. These overall measures were split at the median to yield the two groups for discriminant analysis.

All inter-correlations among the six objective fulfillment variables and the overall objective fulfillment composite, as well as those among the performance indicators are significant at a level of confidence better than 99 percent. (Correlation values are available on request from the senior author).

Tests of Multivariate Normality

The accuracy of the classifications that result from the application of discriminant analysis are sensitive to a key assumption behind the technique, viz., that the predictor variables constitute a multivariate normal population. In real life, however, this assumption proves seldom valid. In fact, few researchers even attempt to test for the validity of this assumption (Eisenbeis, 1977). In the interest of methodological rigor as well as to estimate the extent of deviation from multivariate normality in the present study, tests of multivariate normality were undertaken. For this purpose, the coefficients of skewness and kurtosis of the individual discriminating variables were first computed. For a normally distributed variate, the expected value of skewness is zero, whereas the expected value of kurtosis is three. To test the significance of the coefficients of skewness and kurtosis, the z-tests discussed by Bock (1975) were employed. The detailed results of this analysis are not reported here in the interest of conserving space.

The discriminating variables used in this study displayed significant deviation from normality, as indicated by the significance levels of the z-values. This calls for caution in interpreting the accuracy of the classifications reported here. However, our primary aim in this study is with descriptive rather than predictive relevance (Frank, Massy, & Morrison, 1965). The failure of a key model assumption, which is critical for prescriptive studies, is therefore not believed to constitute a serious challenge to the claim that discriminant analysis is a useful tool for the exploration of the differences between "more effective" and "less effective" planning systems.

RESULTS

A total of 13 discriminant analysis runs were performed for this study. These include the seven runs based on objective fulfillment measures and their composite, the five runs based on the performance measures and their composite, and the run based on "overall satisfaction" (Table 2).

Table 4 shows the results of the discriminant analysis run for the grouping based on overall satisfaction, and serves as a prototype for Tables 5 and 6, which summarize the results for the runs involving objective fulfillment measures and performance measures, respectively. Table 4 is discussed in detail in the following paragraphs.

INSERT TABLES 4, 5, and 6 ABOUT HERE

To begin with, note that in this run the two groups were of approximately equal size. Equal sample sizes are an important consideration in interpreting bias in discriminant analysis (Morrison, 1969). Fifty one of the responding firms could be characterized as "satisfied", while 42 were "dissatisfied" with their strategic planning systems.

The Fisher's linear discriminant function derived from the data was highly significant, with a chi-square value of 45.734 (df = 7) and a p value of 0.0001. The use of this function to classify the 93 cases constituting the total sample resulted in an overall accuracy of 81.7 percent. In other words, of the 93 cases, 81.7 percent were correctly classified by the function as either "satisfied" or "dissatisfied", as the case may have been. The classification accuracy was 84.3 percent for the "satisfied" group and 78.6 percent for the "dissatisfied" group.

A commonly used procedure for assessing the value of the discriminant function as a classification tool is to compare the classification accuracy of the linear classification function against the accuracy that would have resulted from a random assignment of cases to the groups, given their prior probabilities of group membership (Morrison, 1969). Since population priors are not known, sample estimates were used in determining the efficiency of the corresponding "chance" model. Note that the chance criterion results in an expected accuracy of 50.5 percent, which is well below the 81.7 percent accuracy achieved by the discriminant function. Thus, the seven dimensions included in the model are a valuable aid in discriminating between "satisfied" and "dissatisfied" planners.

The use of a linear classification function is premised on the assumption of equal variance-covariance matrices (also known as "dispersion" matrices) for the two groups. When this assumption fails, the linear classification rule is no longer optimal in the sense of minimizing the probabilities of misclassification. Under this condition, the error rate for one group is overstated while that for the other is understated. In this situation, the so called quadratic classification procedure is the appropriate one to use.

For the present run, the use of Box's M test for equality of group dispersion matrices resulted in the rejection of the null hypothesis, as shown in Table 4. The quadratic rule was, therefore used to reclassify the sample. Interestingly, the same overall classification accuracy resulted, attesting to the robustness of the linear classification function. The differences in the classification accuracies within the individual groups were marginal.

It may be added here that in the absence of multivariate normality, the quadratic classification rule does not necessarily improve the classification results (Dillon, 1979). The results of the quadratic classification procedure are presented in this study, wherever applicable, only for comparative purposes. In the discussion of the results, attention will be confined to the results based on the linear rule.

Although tests for two major model assumptions both gave negative results, this was expected, since, seldom do real life data precisely fit the requirements of sophisticated analytical methodologies. In the final analysis, repeated external validation, rather than the analytical rigor of a single study should serve as the evaluation criterion for interpreting the usefulness of any model or technique.

DISCUSSION

From methodological issues, we now turn to substantive ones. Having been satisfied with the overall classification accuracy or discriminating power of the linear discriminant function, attention is turned to examining the variables contributing most to the discrimination. The traditional approach to assessing the relative importance of the variables in a discriminant function has been to examine the absolute magnitude of the standardized discriminant function coefficients, which are treated as analogous to the beta weights in a regression model (Klecka, 1975). Some methodologists, however, question this approach. Mosteller & Wallace (1963) suggested an alternative method for assessing the relative importance of variables (see Appendix 2).

In Tables 4, 5, and 6 the results of both approaches are presented in the following format:

$$a_i \ (X_i) \ b_i, \ i = 1,2,3,\ldots,7$$

where X_i are the standardized discriminant function coefficients, a_i are the rankings based on the absolute value of the standardized discriminant function coefficients, and b_i are the rankings that result when the Mosteller-Wallace procedure is employed. In the case of the run based on overall satisfaction, the two rankings are almost identical. This is not always the case, however, as a glance at Table 5 or Table 6 will readily reveal. In general, the two methods yield identical rankings for the two or three factors ranked at the top. For the specific case of the run based on overall satisfaction, the key discriminators were "resistance to planning", "capacity of the planning system," and "resources provided to the planning function", in that order of importance. Readers can similarly interpret the results shown in Tables 5 and 6.

Interestingly all 13 runs yielded statistically significant discriminant functions. In every case, again, the linear classification accuracies were considerably better than the corresponding chance models, attesting to the value of the function in achieving good discrimination across the two groups involved. That the same set of seven design and contextual dimensions help achieve encouraging levels of discrimination, regardless of the effectiveness criterion employed, suggests that these dimensions are indeed the most salient planning system dimensions. Proposition P1 is thus strongly supported.

Quadratic classification procedures were used in seven runs where the assumption of equal group dispersion matrices was not upheld. Almost always, only modest changes in classificatory efficiency were noticed. The

exceptional situations included two cases where there was a noticeable improvement (5 percent or more) in efficiency, and one where there was, in fact, some deterioration in classification accuracy. In the discussion that follows, we will focus only on the linear classification results.

As the summary of the rankings of the variables in the different discriminant analysis runs shows (Table 7), the

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INSERT TABLE 7 ABOUT HERE

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relative importance of the seven design and contextual dimensions varies depending on the effectiveness criterion. Thus, proposition P2 is also supported. With the exception of "internal facets" and "functional coverage", all the other dimensions ranked as the most important one (from a discrimination point of view) in at least one of the runs. Similarly all but "resistance to strategic planning" ranked as the least important dimension at least once. The three most important discriminators for each effectiveness measure are summarized in Table 8. Because of the limitations of the sample, the results in Table 8 are offered as suggestive rather than definitive. The only generalization that is being made here is that the determinants of planning effectiveness appear to differ depending on what specific effectiveness criterion is employed.

INSERT TABLE 8 ABOUT HERE

Overall, however, "capacity of the system", and "resources provided to the planning function" seem to be the most crucial dimensions of planning, followed by "functional coverage". It is interesting to speculate on the

reasons for the salience of these dimensions, pending further replication and validation of the results of this study.

Enhancing the capability of the system to plan would appear to lead not only to increased satisfaction with planning but also greater levels of objective fulfillment and improved organizational performance. That effective planning would be contingent on the continued support of the planning function through infusion of adequate resources also apperas to be a reasonable proposition. The emergence of "functional coverage" as the third most important discriminating dimension probably underscores the importance of an integrative role for organizational planning.

What is surprising, though, is the relatively low ranking of "resistance to planning," and the "use of techniques" as discriminators. Early writings on strategic planning (Steiner & Schollhammer, 1975) placed considerable emphasis on the resistance issue. It appears that strategic planning is no longer an organizational innovation and is increasingly recognized as a necessity, not a luxury. The initial importance of organizational resistance as an impediment to effective planning seems to have since been supplanted by other considerations, such as enhancing system capability, and functional coverage. This is not to minimize the importance of managing organizational resistance, but with the increasing implementation and action orientation of contemporary corporate planning, wherein participation is emphasized, sources and intensity of resistance may simply have decreased.

In a similar fashion, the admonition that "sophisticated planning techniques do not necessarily produce sophisticated plans or impressive results" is underscored by the lack of distinction between more effective and less effective planners along the techniques dimension. This point is vehemently expressed in the many recent attacks on popular planning

techniques such as portfolio planning and PIMS analyses (Kiechel, 1982; Peters & Waterman, 1981; Wensley, 1982). Techniques may be important for planning but enhancing the effectiveness of planning requires more than the mere use of sophisticated analytical techniques and methodologies.

LIMITATIONS

The major aim of this study was to bring two major improvements to the study of the relationship between planning and performance. The first is the use of a multidimensional view of a planning system and the second is the use of a multiple criteria framework for accessing planning effectiveness.

Although every effort was made to use an appropriate methodology and to execute it as rigorously as possible, two key limitations of this study should be noted. The first relates to our data. We relied on data from a single respondent from each firm. There is a possibility that this may have introduced bias in the data and may raise questions about the validity of our findings. Neither response bias nor functional bias could be assessed because of the size and heterogeneity of our target populations. The second limitation is the cross sectional nature of the study and the inability to impute any causal connections between planning and organizational performance. Future studies should attempt to deal specifically with these two limitations in further extending this important area of inquiry.

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Table 1
A Summary of the Seven Significant Dimensions of Strategic Planning Systems

Dimension	Description	Key Supporting Literature
Capacity of the system (system capability)	The ability of the formal planning system to balance creativity and control; the adaptive capability of the system and its flexibility to support strategy formulation and implementation	Ansoff (1975; 1984) Anthony & Dearden (1976) Camillus (1975) Lorange & Vancil (1977) King & Cleland (1978) Thompson (1967)
Use of planning techniques	The degree of emphasis given to the use of planning techniques to structure the unstructuredness of ill-defined, messy strategic problems	Grant & King (1979, 1982) Hofer & Schendel (1978) Hax & Majluf (1984)
Attention to Internal facets	The degree of attention to internal (i.e., organizational) factors, past performance, and analysis of strengths and weaknesses	Camillus & Venkatraman (1984) Grant & King (1982) King & Cleland (1978) Lorange & Vancil (1977) Stevenson (1976)
Attention to External Facets	The level of emphasis given to monitoring environmental trends	Aguilar (1965) Fahey & King (1977) Keegan (1974) Kefalas & Schoderbek (1973) Thomas (1980)
Functional coverage (Distinctive competencies)	The extent of coverage given to different functional areas with a view to integrate different functional requirements into a general management perspective.	Hitt, Ireland & Palia (1982) Hitt, Ireland & Stadter (1982) Lorange (1980) Snow & Hrebiniak (1980)
Resources provided to the strategic planning function	The degree of organizational support in the form of number of planners, involvement of top management in planning, etc.	King & Cleland (1978) Steiner (1979)
Resistance to Planning	The need to anticipate and overcome resistance to planning and to create a favorable climate for effective planning.	Steiner (1979) Steiner & Schollhammer (1975) Schultz & Slevin (1976)

Table 2
Grouping and Discriminating Variables

Grouping Variables	Discriminating Variables
Objective Fulfillment	
Improvement in short-term performance	
Improvement in long-term performance	
Predicting future trends	Capacity of the system
Evaluating alternatives based on more relevant information	Use of techniques
	Attention to internal facets
Avoiding problem areas	Attention to external facets
Enhancing management development	Functional coverage
Objective composite	Resources provided to the planning function
	Resistance to planning
Overall satisfaction with the planning System	
Performance relative to the competition	
Sales growth	
Earnings growth	
Market share change	
ROI	
Performance composite	

Table 3
Characteristics of Companies and Respondents in the Sample[a]
(n=207)

1. Sales of the Responding Unit

Less than $250 million	17.4
$251 million - $ 1 billion	21.8
Over $ 1 billion	60.9

2. Business Category of the Responding Unit

Consumer goods	19.2
Capital goods	18.7
Raw or semi-finished materials	12.8
Components for finished goods	8.9
Service sector	40.4

3. Organizational Level of Responding Unit

Corporate	81.5
Business unit	18.5

4. Title/Job Responsibility of Responding Executive

Planning	68.5
Other line function	31.5

5. Maturity of the Planning System (Year planning began)

Before 1960	6.2
During 1961-1975	36.7
After 1976	55.2

6. Performance of the Responding Unit Relative to Competition

	Worse or much worse	Equal	Better or much better
Sales growth	18.0	29.0	53.0
Earnings growth	21.0	17.7	61.4
Market share change	18.8	32.0	49.1
Return on investment	23.5	22.9	53.6

[a]All figures are percentages. Non responses have been excluded.

Table 4
Discriminant Analysis Results for Grouping Based on "Overall Satisfaction"

1. Group sizes:

Number of "dissatisfied" planners (Group 1)	42
Number of "satisfied" planners (Group 2)	51

2. Significance level of the linear discriminant function : 0.0001

3. Assumption of equality of group dispersion matrices (p for Box's M) : Not valid (0.0012)

4. Classification accuracy, %

	Linear Classification Rule	Quadratic Classification Rule
Group 1	78.6	76.2
Group 2	84.3	86.3
Overall	81.7	81.7

5. Accuracy of chance model based on sample group probabilities, % 50.5

6. Relative importance of discriminating variables[a]

Capacity of the planning system	3 (-0.3274)	2
Use of techniques	6 (-0.0658)	6
Attention to internal facets	7 (0.0523)	7
Attention to external facets	2 (0.5001)	4
Functional coverage	5 (-0.1659)	5
Resources provided to the planning	4 (-0.2303)	3
Resistance to planning	1 (0.7099)	1

[a]The figures within the parentheses are the standardized discriminant function coefficients. The numbers to the left of the parentheses are the ranks based on the standardized discriminant function coefficients. The numbers to the right are the ranks based on the Mosteller-Wallace procedure.

Table 5
Discriminant Analysis Results for Groupings Based on
Objective Fulfilment Variables

	Objective fulfillment measure[a]						
	O1	O2	O3	O4	O5	O6	Objective composite
Group Sizes							
Group 1: Entirely unfulfilled, Somewhat unfulfilled, or neutral	46	30	42	22	43	48	46
Group 2: Somewhat fulfilled or entirely fulfilled	47	62	51	71	50	44	45
Significance level of the linear discriminant function	0.0157	0.0009	0.0069	0.0189	0.0445	0.0001	0.0009
Assumption of equal group dispersion matrices (p for Box's M)	Valid (0.2838)	Valid (0.1998)	Not valid (0.0245)	Not valid (0.0002)	Valid (0.2256)	Valid (0.1506)	Not Valid (0.0227)
Classification accuracy, %, linear classification rule							
Group 1	65.2	66.7	64.3	68.2	69.8	81.2	73.9
Group 2	72.3	74.2	68.6	67.6	62.0	72.7	71.1
Overall	68.8	71.7	66.7	67.7	65.6	77.2	72.5
Classification accuracy, %, quadratic classification rule							
Group 1	n.a.	n.a.	61.9	50.0	n.a.	n.a.	73.9
Group 2	n.a.	n.a.	80.4	83.1	n.a.	n.a.	71.1
Overall	n.a.	n.a.	72.0	75.3	n.a.	n.a.	72.5
Accuracy of chance model based on sample group prior probabilities, %	50.0	56.0	50.5	63.9	50.3	50.1	50.0
Ranking of discriminating variables[b]							
Capacity of the system	7 (0.00) 7	7 (0.08) 6	3 (0.51) 2	1 (-0.90) 1	1 (1.17) 1	1 (0.65) 1	2 (0.35) 1
Use of techniques	1 (0.82) 1	2 (-0.42) 5	1 (0.59) 1	6 (0.05) 6	2 (-0.56) 3	7 (-0.07) 7	4 (0.27) 4
Attention to internal facets	5 (-0.10) 6	6 (0.14) 7	6 (-0.16) 5	4 (0.21) 4	4 (0.33) 2	5 (0.27) 5	5 (0.27) 5
Attention to external facets	4 (0.21) 4	3 (0.38) 3	2 (-0.51) 7	2 (0.54) 5	3 (-0.51) 7	6 (-0.12) 6	6 (-0.22) 6
Functional coverage	6 (0.09) 5	5 (0.22) 4	4 (0.42) 3	7 (-0.02) 7	7 (0.16) 6	2 (0.49) 2	3 (0.34) 3
Resources provided to the strategic planning function	3 (0.69) 2	1 (0.46) 1	7 (-0.11) 6	5 (-0.15) 3	5 (-0.31) 5	4 (-0.39) 4	7 (-0.03) 7
Resistance to planning	2 (0.77) 3	4 (-0.35) 2	5 (-0.21) 4	3 (0.35) 2	6 (-0.19) 4	3 (-0.40) 3	1 (-0.36) 2

n.a.: not applicable.

[a] O1: Improvement in short term performance; O2: Improvement in long term performance; O3: Predicting future trends; O4: Evaluating alternatives based on more relevant information; O5: Avoiding problem areas; O6: Enhancing management development.

[b] The figures within the parentheses are the standardized discriminant function coefficents. The numbers to the left of the parentheses are the ranks based on the standardized coefficients. The numbers to the right of the parentheses are the ranks obtained when the Mosteller-Wallace procedure is used.

Table 6
Discriminant Analysis Results for Groupings Based on Performance Relative to the Competition

	Performance measure				
	Sales growth	Earnings growth	Market share	ROI	Perforamnce composite
1. Group Sizes					
Group 1: Equal, worse, or much worse	36	33	42	40	43
Group 2: Better or much better	51	53	44	45	42
2. Significance level of the linear discriminant function	0.0112	0.0625	0.0094	0.0021	0.0067
3. Assumption of equality of group dispersion matrices (p for Box's M)	Not valid (0.0001)	Valid (0.0680)	Not valid (0.0001)	Valid (0.1592)	Not valid (0.0004)
4a. Classification accuracy, %, linear classification rule					
Group 1	69.4	63.6	71.4	70.0	72.1
Group 2	68.6	60.4	72.7	75.6	71.4
Overall	69.0	61.6	72.1	72.9	71.8
4b. Classification accuracy, %, quadratic classification rule					
Group 1	69.4	n.a.	76.2	n.a.	71.4
Group 2	70.6	n.a.	65.9	n.a.	61.9
Overall	70.1	n.a.	70.9	n.a.	66.7
5. Accuracy of chance model based on sample group prior probabilities, %	51.5	52.7	50.0	50.2	50.0
6. Ranking of discriminating variables[a]					
Capacity of the system	6 (0.07) 5	6 (-0.12) 6	7 (-0.02) 7	3 (0.69) 3	2 (0.55) 2
Use of techniques	4 (-0.18) 4	7 (-0.06) 7	5 (0.15) 5	7 (0.02) 7	3 (-0.51) 5
Attention to internal facets	2 (0.39) 2	4 (0.28) 5	3 (0.29) 3	5 (-0.46) 6	6 (0.15) 6
Attention to external facets	3 (0.22) 3	2 (0.66) 1	1 (0.69) 1	6 (0.24) 5	7 (0.09) 7
Functional coverage	5 (0.07) 7	5 (0.24) 3	6 (0.10) 6	4 (0.56) 2	4 (0.45) 3
Resources provided to the strategic planning function	1 (0.76) 1	1 (0.67) 2	2 (0.42) 2	2 (0.73) 1	1 (0.66) 1
Resistance to planning	7 (0.06) 6	3 (0.50) 4	4 (0.23) 4	1 (1.02) 4	5 (0.39) 4

n.a.: not applicable

[a] The figures within the parentheses are the standardized discriminant function coefficents. The numbers to the left of the parentheses are the ranks based on the standardized coefficients. The numbers to the right of the parentheses are the ranks obtained when the Mosteller-Wallace procedure is used.

Table 7
Summary of Rankings of Discriminating Variables[a]

Variable	No. of times ranked First	Last	Among Top 3
1. Capacity of the planning system	4	1	8
2. Use of techniques in planning	2	3	3
3. Attention to internal facets	0	1	4
4. Attention to external facets	2	2	4
5. Functional coverage	0	2	6
6. Resources provided to the planning function	4	1	8
7. Resistance to strategic planning	1	0	5

[a]All rankings are based on the Mosteller-Wallace criterion.

Table 8

The Three Most Important Discriminators for Each Effectiveness Measure

Effectiveness Measure	Top Three Discriminators
Objective Fulfillment	
Improvement in short-term performance	Use of techniques Resources provided to the strategic planning function Resistance to planning
Improvement in long-term performance	Resources provided to the strategic planning function Resistance to planning Attention to external facets
Predicting future trends	Use of techniques Capacity of the system Functional coverage
Evaluating alternatives based on more relevant information	Capacity of the system Resistance to planning Resources provided to the strategic planning function
Avoiding problem areas	Capacity of the system Attention to internal facets Use of techniques
Enhancing management development	Capacity of the system Functional coverage Resistance to planning
Performance Relative to the Competition	
Sales growth	Resources provided to the strategic planning function Attention to internal facets Attention to external facets
Earnings growth	Attention to external facets Resources provided to the strategic planning function Functional coverage
Market share changes	Attention to external facets Resources provided to the strategic planning function Capacity of the system
Return on Investment	Resources provided to the strategic planning function Capacity of the system Functional coverage
Overall satisfaction	
Overall satisfaction	Resistance to planning Capacity of the system Resources provided to the strategic planning function

APPENDIX 1

Operationalizations of the Constructs Used

1. CAPACITY OF THE PLANNING SYSTEM (0.871)[a]

Operationalized by using a five-point interval scale ranging from much improvement to much deterioration on the following items:

(i) Ability to anticipate surprises and crises
(ii) Flexibility to adapt to unanticipated changes
(iii) As a mechanism for identifying new business opportunities
(iv) Role in identifying key problem areas
(v) As a tool for managerial motivation
(vi) As a means for generating new ideas
(vii) Ability to communicate top management's expectations down the line
(viii) As a tool for management control
(ix) As a means of fostering organizational learning
(x) Ability to communicate line management's concerns to top management
(xi) As a mechanism for integrating diverse functions/operations
(xii) As a basis for enhancing innovation

In addition, the following item, scaled from strongly disagree to strongly agree was included:

(xiii) Today's system emphasizes creativity among managers more than our previous system

2. USE OF TECHNIQUES (0.834)

Operationalized by using a five-point interval scale ranging from significant decrease in use to significant increase in use on the following items:

(i) Portfolio (e.g., BCG) approaches
(ii) PIMS models
(iii) Financial models
(iv) Zero-based budgeting
(v) Value-based planning
(vi) Project management techniques (e.g., PERT/CPM)
(vii) Stakeholder analysis
(viii) Scenarios/Delphi techniques
(ix) Forecasting and trend analysis

Contd.

APPENDIX 1, continued

3. ATTENTION TO INTERNAL FACETS (0.540)

Operationalized by using a five-point interval scale ranging from significantly less emphasis to significantly more emphasis on the following items:

(i) Internal capabilities
(ii) Past performance
(iii) Reasons for past failures

4. ATTENTION TO EXTERNAL FACETS (0.613)

Operationalized by using a five-point interval scale ranging from significantly less emphasis to significantly more emphasis on the following items:

(i) General economic and business conditions
(ii) Regulatory issues
(iii) World-wide competitive trends
(iv) Supplier trends
(v) Customer/end user preferences
(vi) Technological trends

5. FUNCTIONAL COVERAGE (0.772)

Operationalized by using a five-point interval scale ranging from significantly less emphasis to significantly more emphasis on the following items:

(i) Marketing function
(ii) Operations/manufacturing function
(iii) Finance function
(iv) Personnel function
(v) Purchasing/procurement function
(vi) Research and development/technology
(vii) Computers and MIS

6. RESOURCES PROVIDED TO THE PLANNING FUNCTION (0.597)

Operationalized by using a five-point interval scale ranging from significant decrease to significant increase on the following items:

(i) Number of planners
(ii) Time spent by the chief executive officer in strategic planning
(iii) Involvement of staff managers in strategic planning
(iv) Resources provided for strategic planning

Contd.

APPENDIX 1, continued

7. RESISTANCE TO PLANNING (0.614)

Operationalized by using a five-point interval scale ranging from significant decrease to significant increase on the following items:

(i) Overall emphasis on strategic planning*
(ii) Involvement of line managers in strategic planning*
(iii) Acceptance of the outputs of the strategic planning exercise by top management*
(iv) Resistance to planning in general
(v) Threats to the continuation of strategic planning

8. PLANNING SYSTEM EFFECTIVENESS: OBJECTIVE FULFILLMENT (0.748)

Operationalized by using a five-point interval scale ranging from entirely unfulfilled to entirely fulfilled on the following items:

(i) Improvement in short-term performance
(ii) Improvement in long-term performance
(iii) Predicting future trends
(iv) Evaluating alternatives based on more relevant information
(v) Avoiding problem areas
(vi) Enhancing management development

9. PLANNING SYSTEM EFFECTIVENESS: PERFORMANCE RELATIVE TO COMPETITION (0.953)

Operationalized by using a five-point interval scale ranging from much worse to much better on the following items:

(i) Sales growth
(ii) Earnings growth
(iii) Market share change
(iv) Return on investment (ROI)

[a]Figures in parentheses are the reliability coefficients (Cronbach's alpha) for the respective constructs.

*Reverse coded to indicate resistance.

APPENDIX 2

Ranking of Discriminating Variables

Several methods of ranking the relative importance of discriminating variables are discussed in the literature of discriminant analysis. Eisenbeis (1977) provides a useful summary of these methods, which include the following:

(1) Univariate F-Statistics

(2) Scaled discriminant function coefficients weighted by the appropriate diagonal element of the pooled within group deviation sum of squares

(3) Stepwise forward methods based on contribution to the multivariate F-Statistics

(4) Stepwise backward methods

(5) Conditional deletion methods

(6) The Mosteller-Wallace method

Of these methods, the Mosteller-Wallace method was deemed the most attractive in this study for its intuitive validity, and computational simplicity. Basically it involves ranking of the variables on the basis of the following formula:

$$b_j(x_{j1} - x_{j2}),$$

where b_j is the unstandardized discriminant function coefficient of the discriminating variable j, x_{j1} is the mean value for this variable for group 1 and, x_{j2} the mean value for group 2. This measure has the property that

$$\sum_{j=1}^{m} b_j(\bar{x}_{j1} - \bar{x}_{j2}) = (\bar{z}_1 - \bar{z}_2)$$

where $\bar{z}_1$ and $\bar{z}_2$ are the mean linear discriminant function scores for groups 1 and 2, respectively. This means that the score $b_j(\bar{x}_{j1} - \bar{x}_{j2})$ gives an indication of the change in z associated with a change in x_j and is interpretable as the portion of the discriminant function score separation between the groups, $(\bar{z}_1 - \bar{z}_2)$, that is attributable to the jth variable (Joy & Tollefson, 1975).

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